Value-Focused Thinking:
Providing Structure in Soft Personnel Problems to Enhance Mentoring, Discussion, and Decisions

MAJ Rob Dees
MAJ Sam Huddleston

Task: Provide a tutorial in the leading methodology for making decisions with multiple competing objectives, demonstrate usefulness for modeling of preferences in soft problems requiring structure, and describe recent successes in the personnel arena.
**Value-Focused Thinking: Providing Structure in Soft Personnel Problems to Enhance Mentoring, Discussion, and Decisions**

**United States Military Academy, Department of Systems Engineering, West Point, NY, 10996**


**Approved for public release; distribution unlimited**

**Security classification:**
- Report: Unclassified
- Abstract: Unclassified
- This page: Unclassified

**Limitation of abstract:**
- Same as report (SAR)

**Number of pages:**
- 45
The Components of Our Approach

♦ A Qualitative Value Model: Identifying the Performance Attributes That Our Leaders Value

♦ An End-State Metric of Performance: Measuring the Demonstrated Performance of Those We Have

♦ Strategic Applications
  “What I want is to improve the quality of the Soldiers we have while reducing the dollars we spend to get that quality”
  LTG Freakley, Accessions Command

♦ Statistical Learning: Linking Demonstrated Performance to Performance Attributes and Profiles of Potential
The Components of Our Approach

♦ A Qualitative Value Model: Identifying the Performance Attributes That Our Leaders Value

♦ An End-State Metric of Performance: Measuring the Demonstrated Performance of Those We Have

♦ Strategic Applications
  “What I want is to improve the quality of the Soldiers we have while reducing the dollars we spend to get that quality”
  LTG Freakley, Accessions Command

♦ Statistical Learning: Linking Demonstrated Performance to Performance Attributes and Profiles of Potential
Philosophy and Motivation

Basic Philosophy from Keeney’s Book:
✓ “Values are what we care about. As such, values should be the driving force for our decision-making.”
✓ “Decision-making usually focuses on the choice among alternatives.”
✓ “Alternatives are the means to achieve the more fundamental values.”
✓ “Value-Focused Thinking essentially consists of two activities: first deciding what you want and then figuring out how to get it.”

Motivation from Respected Thinkers:
✓ “The perfection of means and confusion of ends seem to characterize our age.” -Albert Einstein
✓ “When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the state of science.” -Lord Kelvin
✓ “There is no greater impediment to the advancement of knowledge than the ambiguity of words.” -Thomas Reid

Motivation for use in “Soft” Personnel Decisions:
✓ “Many hiring decisions start off on the wrong foot because the company hasn’t clarified exactly what it wants from the new hire.” -Hiring and Keeping the Best People, Harvard Business Essentials
Current Military Application Areas

- Major acquisition decisions
- Evaluate courses of action
- Improve current systems
- Evaluate future concepts
- Analyze force mix
- Justify resource allocation
- Reduce risk
- Allocate training time
- Strategic assessments

Why not personnel decisions?

Benefits of Value-Focused Thinking

Uncovering Hidden Objectives
Creating Alternatives
Identifying Decision Opportunities
Guiding Strategic Thinking
Inter-Connecting Decisions
Guiding Information Collection
Facilitating Involvement
Facilitating Communication
Evaluating Alternatives
Improving Communication
Thinking About Values

We need these benefits in soft personnel problems.

Alternative vs. Value-Focused Thinking
**Difference of Approach**

**Longitudinal Study**
- High Cost
- Long Duration
- Collect massive amounts of data on what we think might solve the problem, and see if something useful is revealed over time.
- “We’ll see in the end.”

**Value-Focused Study**
- Low Cost
- Short Duration
- First determine “what we want.”
- Collect focused data and make inferences on the larger population.
- “Begin with the end in mind.” - Stephen Covey

---

“Many hiring decisions start off on the wrong foot because the company hasn’t clarified exactly what it wants in the new hire.”


“The perfection of means and confusion of ends seems to characterize our age.” - Einstein

Both are needed, but value-focused studies or “what we want” should inspire longitudinal studies.
1. We face a problem with multiple, competing objectives and develop a **qualitative value model** (value hierarchy).

**Fundamental Objective**

**Functions**

- Verb, Object

**Objectives**

- Min, Max, or Optimize

**Value Measures**

- Direct, Proxy, Natural, Constructed

Direct – profit using dollars earned
Proxy – morale using survey results
Natural – no mathematical manipulation
Constructed – some alteration of original measurement
The Mission of the United States Military Academy:

To educate, train, and inspire the Corps of Cadets so that each graduate is a commissioned leader of character committed to the values of Duty, Honor, Country and prepared for a career of professional excellence and service to the Nation as an officer in the United States Army."
Methodology

1. We face a problem with multiple, competing objectives and develop a qualitative value model (value hierarchy).

Fundamental Objective

Functions

Verb, Object

Objectives

Min, Max, or Optimize

Value Measures

Direct, Proxy, Natural, Constructed

Direct – profit using dollars earned
Proxy – morale using survey results
Natural – no mathematical manipulation
Construct – some alteration of original measurement
Affinity Diagramming
Identifying the functions that matter

- “Silent brainstorming”
- List a single system function on a “sticky”
- Post the function on a board
- Rearrange functions as you see natural groups appear
- When complete, label the groupings

PRACTICAL EXERCISE: Officer Performance at Company Level
Methodology

1. We face a problem with multiple, competing objectives and develop a **qualitative value model** (value hierarchy).

2. For every value measure in our value hierarchy, we develop **screening criteria** that indicate our minimum acceptable and ideal levels.

3. For every value measure, we develop **swing weights** to reflect the relative importance of value measures across their ranges of variation. These swing weights must sum to 1, or account for 100% of value.

4. For every value measure, we develop **value functions** that reflect returns to scale between our minimum acceptable and ideal levels.

Methodology

Single dimensional value functions set a “common currency” for all value measures and reflect our preferences across the possible range for each value measure.

• Four shapes are common
• Value functions may be continuous or discrete.
• Value functions are usually scaled from
  • 0 to 1
  • 0 to 10
  • 0 to 100
Methodology

1. We face a problem with multiple, competing objectives and develop a qualitative value model (value hierarchy).

2. For every value measure in our value hierarchy, we develop screening criteria that indicate our minimum acceptable and ideal levels.

3. For every value measure, we develop swing weights to reflect the relative importance of value measures across their ranges of variation.

4. For every value measure, we develop value functions that reflect returns to scale between our minimum acceptable and ideal levels.

5. The additive value model is the most commonly used to evaluate and compare alternatives:

\[ V(x) = \sum_{i=1}^{n} w_i v_i(x_i) \]

where \( V(x) \) is the total value for an alternative,

\( w_i \) is the swing weight of the \( i^{th} \) value measure,

\( v_i(x_i) \) is the value function for the \( i^{th} \) value measure,

\( x_i \) is the measure score of an alternative on the \( i^{th} \) value measure.
10 Minute Break
Results of Affinity Diagram Exercise
The Components of Our Approach

♦ A Qualitative Value Model: Identifying the Performance Attributes That Our Leaders Value

♦ An End-State Metric of Performance: Measuring the Demonstrated Performance of Those We Have

♦ Strategic Applications

   “What I want is to improve the quality of the Soldiers we have while reducing the dollars we spend to get that quality”

   LTG Freakley, Accessions Command

♦ Statistical Learning: Linking Demonstrated Performance to Performance Attributes and Profiles of Potential
WholeSoldier Performance Model

**Purpose:**
- Selfless Service
- Sacrifice
- Commitment
- Loyalty
- Duty

**Motivation:**
- Will to Win
- Endurance
- Resilience
- Stick-to-it-iveness
- Heart / Drive
- Determination
- Determination
- Will
- Endurance
- Resilience
- Stick-to-it-iveness
- Heart / Drive
- Determination
- Work Ethic

**Character:**
- Honor
- Integrity
- Justice
- Candor
- Personal Courage

**Conduct:**
- Maturity
- Discipline
- Bearing
- Coolness

**Interaction:**
- Respect
- Empathy
- Compassion
- Humor

**Knowledge:**
- Job Tasks/Skills
- Education
- Trainability
- Learning

**Judgment:**
- Common Sense
- Logical Decisions
- Understanding
- Anticipation
- Insight/Filtering
- Adaptive/Flexible

**Application:**
- Planning
- Communicating
- Executing

**Medical Health:**
- Illness Resistance
- Nutrition
- Body Composition

**Athletic Skills:**
- Coordination
- Agility
- Balance
- Power
- Speed
- Accuracy
- Flexibility
- Reaction Time

**General Fitness:**
- Cardio Endurance
- Cardio Strength
- Muscular Endurance
- Muscular Strength

**Self-Esteem:**
- Confidence
- Self-Worth
- Self-Efficacy

**Cognitive Domain**

**Moral Domain**

**Physical Domain**
“WholeSoldier” Sample Performance Report
Infantryman #24

MORAL PERFORMANCE

- **Character**: Totally trustworthy, and always sticks up for what is right.
- **Purpose**: Displays commitment and self-sacrifice to the team 95% of the time.
- **Motivation**: Soldier puts forth max effort and only rarely gives less than his all.
- **Interaction**: Shows respect and is compassionate, but sometimes is awkward in interpersonal interactions.
- **Self-Esteem**: Doesn’t display confidence or view himself as a valuable member of the team.
- **Conduct**: Soldier displays maturity and discipline by completing tasks without supervision, but sometimes loses his cool when under stress.

Cognitive Performance = 15/25 = 4.20/7
- **Knowledge**: Soldier demonstrates total knowledge of MOS tasks and studies to learn next level up.
- **Judgment**: Makes logical decisions, but has problems filtering irrelevant information.
- **Application**: Sometimes unable to plan effectively to implement decisions.

Physical Performance = 12/16 = 5.25/7
- **Fitness**: Scored 263 last APFT.
- **Athleticism**: Displays better than average coordination, agility in combat-focused tasks.
- **Health**: Maintains body better than average.

“WholeSoldier” Performance = 71/100 = 4.97/7

We can better mentor...
## WholeSoldier

### Sample Population Data

#### 4 Infantry Platoons

<table>
<thead>
<tr>
<th>NAME</th>
<th>Purpose</th>
<th>Social</th>
<th>Conduct</th>
<th>Character</th>
<th>Self-Esteem</th>
<th>Thought</th>
<th>Capability</th>
<th>Physical</th>
<th>Medical</th>
<th>Elicited Total</th>
<th>Moral</th>
<th>Cognitive</th>
<th>Physical</th>
<th>Total</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>100</td>
<td>59</td>
<td>25</td>
<td>15</td>
<td>98.8298</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>99</td>
<td>51</td>
<td>21</td>
<td>15</td>
<td>97.5789</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>95</td>
<td>60</td>
<td>22</td>
<td>14</td>
<td>88.6244</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>94</td>
<td>63</td>
<td>21</td>
<td>13</td>
<td>83.9536</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>93</td>
<td>66</td>
<td>22</td>
<td>12</td>
<td>80.5299</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>92</td>
<td>69</td>
<td>23</td>
<td>11</td>
<td>77.9978</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>91</td>
<td>72</td>
<td>24</td>
<td>10</td>
<td>75.3288</td>
<td>7</td>
</tr>
<tr>
<td>WholeSoldier</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Method:

1. Assess sub-domain performance (1-7).
2. Evaluate performance holistically (1-100).
3. Use correlation analysis to infer weights.

### Finding / Insight:

- WholeSoldier “tells the story” of individual areas of relative strength and weakness and allows us to “see” the entire population.

### Conclusion:

- We can provide many levels of distinction on WholeSoldier Performance.
- WholeSoldier Performance assessment is useful feedback to subordinates for use as a developmental counseling tool.
- WholeSoldier Performance is a good “endstate metric” and will provide information for sound decision-making in many areas.

---

**THE FOLLOWING INSIGHTS ARE ONLY POSSIBLE BECAUSE WE HAVE CLEARLY DEFINED OUR DESIRED ENDSTATE!**
Insight: There is no apparent relationship between “Cognitive Performance” as evaluated in units (different from academic definition) with AFQT score.

**Finding:**

Insight: “Sir, I care a lot more about common sense than I do about book smarts.”

**Conclusion:** AFQT may not be a good predictor of what we want (quality) in terms of performance, but has been shown to be related to retention (quantity).

**Data Source:** Performance Data, USAREC Data, & Questionnaire Results as analyzed by ORCEN & CDAS
**Insight**

Reason for Joining

2) Which of the following is second most important to you about joining the Army?

1) action & adventure
2) steady paycheck
3) service to Nation
4) college benefits
5) tough challenges
6) health benefits
7) good people/friends
8) a fresh start in life

**Finding:** Reasons for joining the service are statistically significant.

**Insight:** “Marines ‘issue a challenge’ / ‘sell it on service.’” –Dozens of interviewees

**Conclusion:** Pay and benefits may do a good job of impacting quantity as recruiting and marketing tools, but we would desire to inspire people to join for service, challenges, and the camaraderie of other good people when considering quality...

**Data Source:** Performance Data, USAREC Data, & Questionnaire Results as analyzed by ORCEN & CDAS
Finding: 80% confidence that average Soldier Performance is higher for West South Central than for Middle Atlantic...Moral Performance drives this finding.

Insight: More data will allow us to see differences at state, county, and smaller levels...

Conclusion: With more performance data, we can better focus our recruiting efforts!!!

Data Source: Performance Data, USAREC Data, & Questionnaire Results as analyzed by ORCEN & CDAS
These insights are now quantifiable beyond anecdote because we have defined our endstate with WholeSoldier Performance.

**AFQT:** AFQT does not predict cognitive performance as defined in this study; it has been shown to predict retention.

**HS Graduation:** HS Graduation appears to somewhat indicate a level of “stick-to-it-iveness,” but not statistically significant in our data.

**Reason for Joining:** Soldiers that joined for service to the Nation, tough challenges, and the camaraderie of good people perform better than those that joined for a steady paycheck, college benefits, or a fresh start.

**Athletic Participation:** Soldiers that participated in more than 9 seasons of Varsity or Junior Varsity team sports perform better than others.

**Seeking/Sought for Help:** Soldiers reporting that they seek help during difficulty or are frequently sought out for help to discuss personal problems perform better than those that don’t/aren’t.

**Thankfulness:** Soldiers that report feeling pretty thankful for the people and things in their lives with high frequency perform better than those that don’t.

**Attitude Towards Authority:** Soldiers reporting that their teachers/bosses frequently told them to do stupid things performed worse than those who didn’t.
Similar System... Marine FITREP

- Provides 7 levels of distinction on desired attributes.
- Only lowest “block” is adverse; majority of levels focus on success.
- Provides clear verbal definitions of levels.

### E. INDIVIDUAL CHARACTER

#### 1. COURAGE
Moral or physical strength to overcome danger, fear, difficulty or anxiety. Personal acceptance of responsibility and accountability, placing conscience over competing interests regardless of consequences. Conscious, overriding decision to risk bodily harm or death to accomplish the mission or save others. The will to persevere despite uncertainty.

<table>
<thead>
<tr>
<th>ADV</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Demonstrates inner strength and acceptance of responsibility commensurate with scope of duties and experience. Willing to face moral or physical challenges in pursuit of mission accomplishment.
- Guided by conscience in all actions. Proven ability to overcome danger, fear, difficulty or anxiety. Exhibits bravery in the face of adversity and uncertainty. Not deterred by morally difficult situations or hazardous responsibilities.
- Uncommon bravery and capacity to overcome obstacles and inspire others in the face of moral dilemma or life-threatening danger. Demonstrated under the most adverse conditions. Selfless. Always places conscience over competing interests regardless of physical or personal consequences.

#### 2. EFFECTIVENESS UNDER STRESS
Thinking, functioning and leading effectively under conditions of physical and/or mental pressure. Maintaining composure appropriate for the situation, while displaying steady purpose of action, enabling one to inspire others while continuing to lead under adverse conditions. Physical and emotional strength, resilience and endurance are elements.

<table>
<thead>
<tr>
<th>ADV</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Exhibits discipline and stability under pressure. Judgment and effective problem-solving skills are evident.
- Consistently demonstrates maturity, mental agility, and willpower during periods of adversity. Provides order out of chaos through the application of intuition, problem-solving skills, and leadership. Composure reassures others.
- Demonstrates seldom-matched presence of mind under the most demanding circumstances. Stabilizes any situation through the resolute and timely application of direction, focus and personal presence.

#### 3. INITIATIVE
Action in the absence of specific direction. Seeing what needs to be done and acting without prompting. The instinct to begin a task and follow through energetically on one’s own accord. Being creative, proactive and decisive. Transforming opportunity into action.

<table>
<thead>
<tr>
<th>ADV</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Demonstrates willingness to take action in the absence of specific direction. Acts commensurate with grade, training and experience.
- Highly motivated and proactive. Displays exceptional awareness of surroundings and environment. Uncanny ability to anticipate mission requirements and quickly formulate original, far-reaching solutions. Always takes decisive, effective action.

#### JUSTIFICATION:
Formally provides guidance on inflated reports.

Evaluates “Rater Courage.”

H. FULFILLMENT OF EVALUATION RESPONSIBILITIES

1. EVALUATIONS. The extent to which this officer serving as a reporting official conducted, or required others to conduct, accurate, uninflated, and timely evaluations.

<table>
<thead>
<tr>
<th>ADV</th>
<th>Occasionally submitted untimely or administratively incorrect evaluations. As RS, submitted one or more reports that contained inflated markings. As RO, concurred with one or more reports from subordinates that were returned by HQMC for inflated marking.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVA</td>
<td>Prepared uninflated evaluations which were consistently submitted on time. Evaluations accurately described performance and character. Evaluations contained no inflated markings. No reports returned by RO or HQMC for inflated marking. No subordinates' reports returned by HQMC for inflated marking. Few, if any, reports were returned by RO or HQMC for administrative errors. Section Cs were void of superlatives. Justifications were specific, verifiable, substantive, and where possible, quantifiable and supported the markings given.</td>
</tr>
<tr>
<td>N/O</td>
<td>No reports submitted late. No reports returned by either RO or HQMC for administrative correction or inflated markings. No subordinates' reports returned by HQMC for administrative correction or inflated markings. Returned procedurally or administratively incorrect reports to subordinates for correction. As RO nonconcurred with all inflated reports.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

JUSTIFICATION:
Similar System...Marine FITREP

- Provides senior raters with 8 block levels in profile.
- Profile weighted such that only bottom level is “adverse.”
- Top 5 blocks equivalent to our single top block.

<table>
<thead>
<tr>
<th>K. REVIEWING OFFICER COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. OBSERVATION:</td>
</tr>
<tr>
<td>2. EVALUATION:</td>
</tr>
<tr>
<td>3. COMPARATIVE ASSESSMENT:</td>
</tr>
<tr>
<td>Provide a comparative assessment of potential by placing an &quot;X&quot; in the appropriate box. In marking the comparison, consider all Marines of this grade whose professional abilities are known to you personally.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>COMPARATIVE ASSESSMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>THE EMINENTLY QUALIFIED MARINE</td>
<td>1</td>
</tr>
<tr>
<td>ONE OF THE FEW EXCEPTIONALLY QUALIFIED MARINES</td>
<td>3</td>
</tr>
<tr>
<td>ONE OF THE MANY HIGHLY QUALIFIED PROFESSIONALS WHO FORM THE MAJORITY OF THIS GRADE</td>
<td>5</td>
</tr>
<tr>
<td>A QUALIFIED MARINE</td>
<td>7</td>
</tr>
<tr>
<td>UNSATISFACTORY</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>

44 total

Key Attributes
- More distinction on levels of performance (A Distribution)
- Quantifiable evaluation facilitates analysis to support decisions
- Enforcement of profile and culture of “truth telling”
End-State Metrics
How Do You Reflect Performance?

The Army OER

A Utility Approach

The Marine FITREP

**Pairwise comparison for order**

<table>
<thead>
<tr>
<th>Asset</th>
<th>Asset A</th>
<th>Asset B</th>
<th>Asset C</th>
<th>Asset D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset A</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Asset B</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Asset C</td>
<td>2</td>
<td>1</td>
<td></td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Asset D</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

**Bonus assignment for value**

FAIL! HARD! SUCCESS!
The Components of Our Approach

♦ A Qualitative Value Model: Identifying the Performance Attributes That Our Leaders Value

♦ An End-State Metric of Performance: Measuring the Demonstrated Performance of Those We Have

♦ Strategic Applications
  “What I want is to improve the quality of the Soldiers we have while reducing the dollars we spend to get that quality”

  LTG Freakley, Accessions Command

♦ Statistical Learning: Linking Demonstrated Performance to Performance Attributes and Profiles of Potential
Given “WholeSoldier” Performance implementation, we can better:

Recruit: Develop holistic model of “WholeRecruit” Potential longitudinally and:

- **Quantify risks/opportunities** involved in adjusting enlistment policies/standards.
- “Screen in” during times of recruiting difficulty and “screen out” in times of recruiting richness.
- **Offer individual incentives** for various MOS based on WholeRecruit Potential, desires of the candidate, and needs of the Army.
- Continually **consider various “entry metrics”** for updates to the WholeRecruit model.
- **Adjust target market** and allocate assets based on both quantity and quality.
- **Adjust marketing message** to target “who we want.”
- **Issue recruiting missions** to reflect a distinct quantity vs. quality balance.

**Expected Soldier Performance Given Varying Recruit Potential**

- ▼ = High Performance based on Potential
- ▲ = Expected Performance
- □ = Low Performance based on Potential

**NOTE:** Only for discussion of possibilities; not intended as a conclusive result for use in current decisions.
Given “WholeSoldier” Performance implementation, we can better:

**Train:**
- Offer individual training/education to those that are “best qualified” or “most needy.”
- Measure performance ROI of training/education programs.
- Design unit training/education to address performance trends.

**Retain:**
- Offer individual targeted incentives to retain “who we want.”

**Promote/Assign:**
- Understand attributes desired in next grade and promote “best qualified.”
- Assign the right individual to the right job or officer career field.
Given “WholeSoldier” Performance implementation, we can better:

**Accomplish the Mission:**
> Relate WholeSoldier to WholeUnit performance by determining effects of differing portfolios of individual performance attributes combined to maximize unit performance through Systems Dynamics.

**Allocate Resources:**
> Investigate best allocation of budgetary resources across the DOTMLPF(EE) spectrum.

**Warfighting Power:**
\[
W = (D+O+M+F) * (LP)^{TEE}
\]

- **W** = Warfighting Power
- **D** = Doctrine
- **O** = Organization
- **M** = Materiel
- **F** = Facilities
- **L** = Leadership
- **P** = Personnel
- **T** = Training
- **E** = Experience
- **E** = Education

- Modified from GEN Schoomaker/GEN Boykin discussion
Given “WholeSoldier” Performance implementation, we can better:

**Develop and Counsel Soldiers:**

Provide Strategic Situational Awareness:

- Policy Decision
- Business Model
  - Google
  - Amazon.com

= Measured Effect
  = Situational Awareness
The Components of Our Approach

♦ A Qualitative Value Model: Identifying the Performance Attributes That Our Leaders Value

♦ An End-State Metric of Performance: Measuring the Demonstrated Performance of Those We Have

♦ Strategic Applications

  “What I want is to improve the quality of the Soldiers we have while reducing the dollars we spend to get that quality”

  LTG Freakley, Accessions Command

♦ Statistical Learning: Linking Demonstrated Performance to Performance Attributes and Profiles of Potential
Purpose
Develop an application to predict the future performance of a recruit based upon attributes we can observe about that recruit upon their indication of interest in service.

Objectives
- Identify pre-existing attributes that indicate the potential for a high performing Soldier
- Develop predictive models that leverage the known attributes of a recruit to predict performance in an operational unit
- Improved ability to screen soldiers who are unlikely to perform well in units

Technical Approach
- Identify Data Shortfalls: Officer Candidate vs. Enlisted Soldier
- Surveys for Additional Data Collection
- WholeSoldier Performance Assessment
- Data Mining (Regression, Neural Networks, LDA, SVM etc.) to link Performance to Potential

Deliverables
- QRR Presentation on Methodology (JAN 09)
- OSUT Success Prediction Model (MAR ‘10)
- In-Unit Success P2P Model (JUL ‘10)
- Final Briefing (JUL’10)
- Technical report (AUG 1’0)
WholeSoldier Performance Assessment

Poor Performance “Screen Out”

Excellence “Screen In”

Acceptable
Classification Model Performance

Excellence

Accuracy = 45%
Precision = 100%

Poor Performance

Accuracy = 36%
Precision = 100%

TEACHING FUTURE ARMY LEADERS TO SOLVE COMPLEX PROBLEMS
<table>
<thead>
<tr>
<th>Predictors</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accessions Database</strong></td>
<td><strong>Unit Record</strong></td>
</tr>
<tr>
<td>- ASVAB/AFQT</td>
<td><strong>Positive</strong></td>
</tr>
<tr>
<td>- HS Diploma</td>
<td>- SOM / SOQ</td>
</tr>
<tr>
<td>- Medical Waiver</td>
<td>- Promotion</td>
</tr>
<tr>
<td>- Moral Waiver</td>
<td>- APFT/Rifle Qual</td>
</tr>
<tr>
<td>- Age</td>
<td>- <strong>Negative</strong></td>
</tr>
<tr>
<td>- Demographics</td>
<td>- Chapter</td>
</tr>
<tr>
<td>- Family</td>
<td>- UCMJ</td>
</tr>
<tr>
<td><strong>TAPAS Score</strong></td>
<td><strong>Positive</strong></td>
</tr>
<tr>
<td>- “Can Do”</td>
<td>- Character</td>
</tr>
<tr>
<td>- “Will Do”</td>
<td>- Motivation</td>
</tr>
<tr>
<td><strong>Soldier Survey</strong></td>
<td>- Thought</td>
</tr>
<tr>
<td>- Athletics</td>
<td>- Purpose</td>
</tr>
<tr>
<td>- Leadership</td>
<td>- Conduct</td>
</tr>
<tr>
<td>- Extracurricular</td>
<td></td>
</tr>
</tbody>
</table>
The Research Question

- What attributes are statistically linked to poor performance?
  - Failure to complete OSUT
  - WholeSoldier Performance Assessment Model (Character and Conduct)
  - Unit Recommendation of Removal (WholeSoldier Counseling)
  - APFT/Marksmanship Failure
  - Article 15/UCMJ Action in Unit

- What attributes are statistically linked to excellence?
  - Special Recognition in OSUT
  - Special Recognition in Unit (Soldier Boards, Promotion etc.)
  - APFT/Marksmanship Excellence
  - WholeSoldier Performance Assessment Model (Character, Motivation, Thought, Purpose)
The outcome of this analysis is a series of profiles.

Because of measurement error (accuracy/precision) on the response variables, it is not possible to calculate the probability of poor performance for a given profile.

It is possible to calculate a lower bound of that probability using the presumption of competence.

We can use that lower bound as a profile risk score.

**Profile X**
- Data Set of 1000
- 95 observations
- 45 “Poor Performers”

\[
\text{Lower Bound of } P(\text{Poor} | X) = 47\%
\]

**Profile Y**
- Data Set of 1000
- 150 observations
- 20 “Poor Performers”

\[
\text{Lower Bound of } P(\text{Poor} | Y) = 13\%
\]
Hypothetical WholeSoldier Application

- The outcome of this analysis is a series of profiles.
- Because of measurement error (accuracy/precision) on the response variables, it is not possible to calculate the probability of poor performance for a given profile.
- It is possible to calculate a lower bound of that probability using the presumption of competence.
- We can use that lower bound as a profile risk score.

**Profile X**
- Data Set of 1000
- 95 observations
- 45 WholeSoldier Failures

Lower Bound of $P(\text{Poor} | X) = 47\%$

**Profile Y**
- Data Set of 1000
- 150 observations
- 20 WholeSoldier Failures

Lower Bound of $P(\text{Poor} | Y) = 13\%$

The hard part is identifying statistically significant profiles.
Hypothetical WholeSoldier Application

- The outcome of this analysis is a series of profiles.
- Because of measurement error (accuracy/precision) on the response variables, it is not possible to calculate the probability of poor performance for a given profile.
- It is possible to calculate a lower bound of that probability using the presumption of competence.
- We can use that lower bound as a profile risk score.

**Profile X**
- Data Set of 1000
- 95 observations
- 45 WholeSoldier Failures

**Profile Y**
- Data Set of 1000
- 150 observations
- 20 WholeSoldier Failures

Lower Bound of $P(\text{Poor}|X) = 47\%$

Lower Bound of $P(\text{Poor}|Y) = 13\%$

**Statistical Learning**
Questions/Discussion

1. WholeSoldier Performance Study (MAJ Dees)
   Problem: The Army needs a holistic model of Soldier performance in the moral, cognitive, and physical domains.

2. WholeOfficer Performance Study (Cadets)
   Problem: The Army needs a system to accurately assess the performance of officers in a holistic manner that provides significant distinction.

3. WholeCadet Performance Study (Cadets)
   Problem: USMA needs a system to accurately assess the performance of cadets in a holistic manner that provides significant distinction.

4. WholeRecruit Potential to Performance Study (MAJ Huddleston)
   Problem: The Army needs a holistic model of recruit potential to predict WholeSoldier Performance. The Army can establish automated data-basing of WholeSoldier Performance data that facilitates longitudinal modeling of WholeRecruit Potential to provide strategic situational awareness and leading indicators.